CLAIMS

1. A process for determining the quality of a weld, the process comprising:

(a) measuring a welding parameter;

(b) comparing a tolerance curve and the parameter;

(c) generating a measurement curve from the measuring;

(d) smoothing the measurement curve;

(e) creating a tolerance curve based on the smoothed measurement curve;

(f) determining a difference between the tolerance curve and the parameter; and

(g) evaluating the weld quality based on the difference.

2. The process of Claim 1, further comprising continually measuring, comparing and evaluating the parameter over a specified time.

3. The process of Claim 2, wherein the specified time is between about 100 μs and 1000 μs.

4. The process of Claim 2, wherein the specified time is between about 200 μs and 500 μs.

5. The process of Claim 2, further comprising comparing the measurement curve to the tolerance curve to determine disturbance.

6. The process of Claim 5, further comprising evaluating the disturbance to determine weld quality.

7. The process of Claim 5, wherein the disturbance is a high frequency disturbance.

8. The process of Claim 1, further comprising smoothing by means of a low pass filter.

9. The process of Claim 8, wherein the filter has a band pass between about 20 Hz and about 400 Hz.

10. The process of Claim 8, wherein the filter has a band pass between about 50 Hz and about 250 Hz.

11. The process of Claim 1, further comprising generating tolerance curves above and below the smoothed measurement curve.

12. The process of Claim 1, wherein the parameter is arc voltage.

13. A welding method for welding an element to a component using a feed unit and a welding head, the method comprising:

(a) feeding the element from the feed unit to the welding head;

(b) energizing the welding head;

(c) welding the element to the component;

(d) measuring a welding parameter during welding;

(e) generating a measurement curve from the measuring;

(f) smoothing the measurement curve;

(g) creating a tolerance curve based on the smoothed measurement curve;

(h) comparing the tolerance curve and the parameter;

(i) determining a difference between the curve and the parameter; and

(j) evaluating the weld quality based on the difference.

14. The process of Claim 13, further comprising continually measuring, comparing and evaluating the parameter over a specified time.

15. The process of Claim 14, wherein the specified time is between about 100 μs and 1000 μs.

16. The process of Claim 15, wherein the specified time is between about 200 μs and 500 μs.

17. The process of Claim 13, further comprising smoothing by means of a low pass filter.

18. The process of Claim 17, wherein the filter has a band pass between about 20 Hz and about 400 Hz.

19. The process of Claim 17, wherein the filter has a band pass between about 50 Hz and about 250 Hz.

20. The process of Claim 14, further comprising comparing the measurement curve to the tolerance curve to determine disturbances.

21. The process of Claim 20, further comprising evaluating the disturbance to determine weld quality.

22. The process of Claim 21, wherein the disturbance is a high frequency disturbance.

23. The process of Claim 13, further comprising generating tolerance curves above and below the smoothed measurement curve.

24. The process of Claim 13, wherein the parameter is arc voltage.

25. A welding method for welding an element to a component using a feed unit and a welding head and ensuring weld quality, the method comprising:

(a) feeding the element from the feed unit to the welding head;

(b) lifting the element to a height along a substantially linear path in relation to the component;

(c) energizing the welding head;

(d) welding the element to the component;

(e) measuring a welding parameter during welding for a specified time;

(f) generating a measurement curve;

(g) smoothing the measurement curve using a low pass filter;

(h) creating a tolerance curve based on a specified tolerance above and below the smoothed measurement curve;

(i) comparing a tolerance curve and the measurement curve;

(j) sensing a difference between the tolerance curve and the measurement curve;

(k) evaluating the weld quality based on the difference;

(l) retracting the element in relation to the component; and

(m) stopping energy to the welding head.

26. The process of Claim 25 further comprising comparing the measurement curve to the tolerance curve to determine disturbance.

27. The process of Claim 26, further comprising evaluating the disturbance to determine weld quality.

28. The process of Claim 26, wherein the disturbance is a high frequency disturbance.

29. The process of Claim 25, further comprising smoothing by means of a low pass filter.

30. The process of Claim 29, wherein the filter has a band pass between about 20 Hz and about 400 Hz.

31. The process of Claim 29, wherein the filter has a band pass between about 50 Hz and about 250 Hz.

32. The process of Claim 25, wherein the specified time is between about 100 μs and 1000 μs.

33. The process of Claim 29, wherein the specified time is between about 200 μs and 500 μs.

34. The process of Claim 25, wherein the parameter is arc voltage.

35. A welding system for welding a element to a component, the system comprising:

(a) a welding head operably initially moving the element in relation to the component and later returning the element;

(b) a measurer operable measuring at least one welding parameter;

(c) a power supply operably providing power for creating an arc between the component and the element;

(d) a controller operably controlling the welding head and determining weld quality based on the measured parameter by generating a measurement curve from the measuring, smoothing the measurement curve, creating a tolerance curve based on the smoothed measurement curve and detecting a difference between the tolerance curve and the parameter; and

(e) an analyzer operable evaluating arc voltage and controlling the power supply.

36. The system of claim 35, wherein the element is a metal stud and the component is a metal sheet.

37. The system of claim 36, wherein the metal stud and the metal sheet are parts of a motor vehicle.

38. The system of Claim 35, further comprising a user interface operably controlling the system.

39. The system of Claim 38, wherein the user interface displays welding parameters.

40. The system of Claim 35, further comprising an electric motor operably lifting and lowering the element.

41. The system of Claim 35, wherein the system includes multiple welding heads.

42. The system of Claim 35, wherein the element is arc welded to the component by the welding head.

43. The system of Claim 35, further comprising an analysis device operably evaluating arc voltage and controlling power supply, based on feedback from arc voltage evaluation.